# EFFECTS OF SOCIAL HOUSING CONDITIONS ON ETHANOL-INDUCED BEHAVIORAL SENSITIZATION IN MICE

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## BACKGROUND

**Behavioral and neural sensitization refers to to the progressive increase in the neurobiological or behavioral effects of the same dose of drug following its repeated administration. Behavioral and neural sensitization is suggested to play a key role in drug abuse and addiction. In laboratory mice, ethanol-induced behavioral sensitization is generally modeled as a progressive increase in the locomotor stimulant effects of ethanol over repeated injections[1]**

**Various environmental changes were shown to impact locomotor sensitization to psychoanaleptics and ethanol. However, the effects of the social conditions of housing on ethanol sensitization have received little attention so far[2,3].**

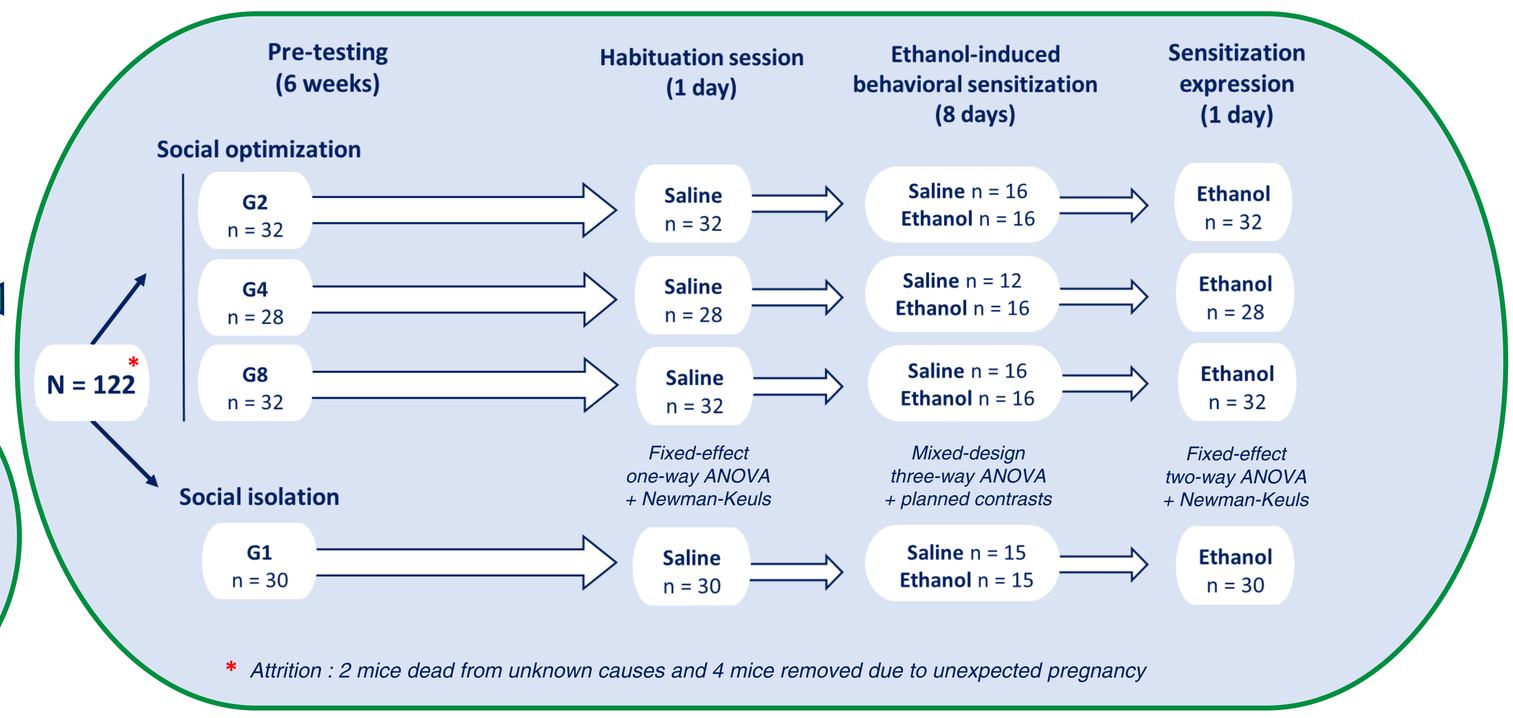
**The aim of the present study was to investigate how the size of the housing group of mice affects ethanol-induced locomotor sensitization.**

## METHOD

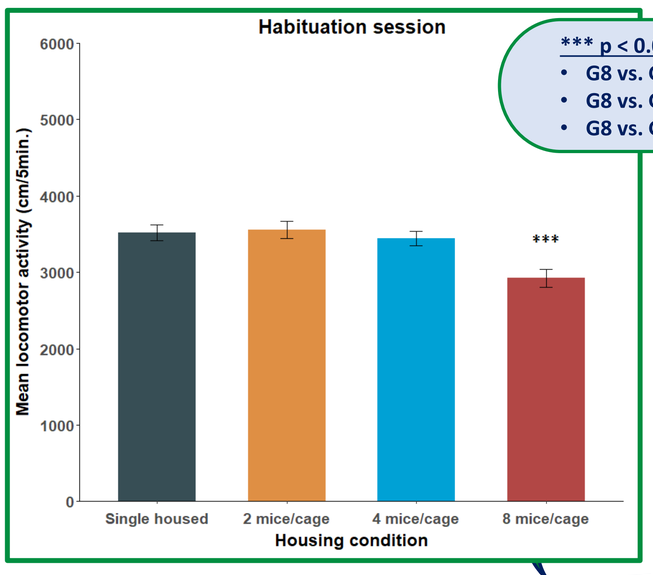
**128 female Swiss mice**
**(4 weeks old) divided into 4 equal housing groups :**
- **G1 = single housed**
- **G2 = housed 2 per cage**
- **G4 = housed 4 per cage**
- **G8 = housed 8 per cage**

**6 weeks of pre-testing (10 weeks old)**

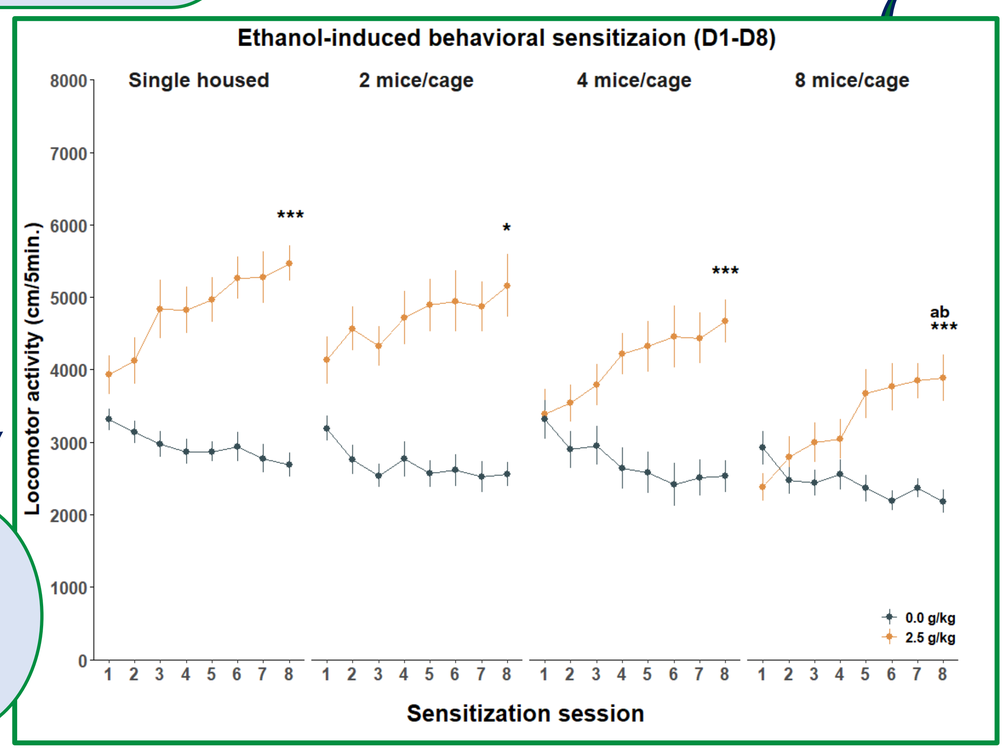
**Behavioral test chambers : open fields (40 x 40 x 40 cm)**
**Locomotor activity recorded by videotracking (cm)**
- **D0 : habituation session (5 min.), saline**
- **D1-D8 : ethanol-induced behavioral sensitization**
- **(5 min.), ethanol 2,5 g/kg or saline**
- **D9 : sensitization expression (30 min.), ethanol 2,5 g/kg**



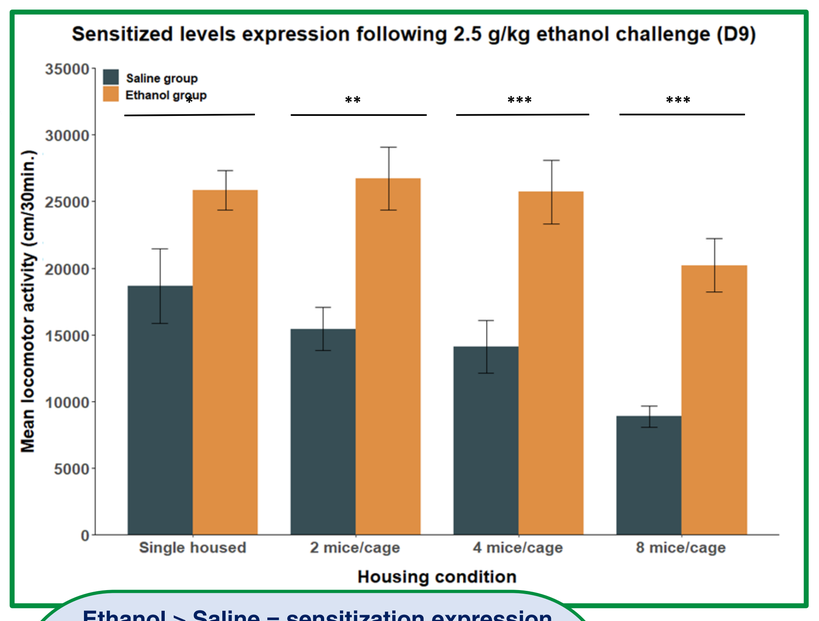

## MAIN RESULTS




**<u>*** p < 0.001</u>**
- **G8 vs. G1 Cohen's d = 0.87**
- **G8 vs. G2 Cohen's d = 0.95**
- **G8 vs. G4 Cohen's d = 0.96**




**<u>D8 > D1 = acquisition of sensitization</u>**
***** G1 Cohen's d = 1.56 (p < 0.001)**
*** G2 Choen's d = 0.67 (p < 0.01)**
***** G4 Cohen's d = 0.99 (p < 0.001)**
***** G8 Cohen's d = 1.44 (p < 0.001)**
**<u>D8 vs. D8 = sensitized levels</u>**
**a G8 < G1 Cohen's d = 1.40 (p < 0.001)**
**b G8 < G2 Cohen's d = 0.83 (p < 0.01)**




**<u>Ethanol > Saline = sensitization expression</u>**
*** G1 Cohen's d = 0.83 (p < 0.05)**
**** G2 Cohen's d = 1.40 (p < 0.01)**
***** G4 Cohen's d = 1.39 (p < 0.001)**
***** G8 Cohens'd d = 1.84 (p < 0.001)**

## CONCLUSION

**All groups of mice developed a psychomotor sensitization to a moderate dose of ethanol. While the process of sensitization per se (D9) was not affected by the housing social conditions, both the initial (D1) and chronic (D1-D8) sensitivities to the stimulant effects of ethanol were significantly affected by the size of the housing groups. Isolated mice and mice housed in pairs were the most sensitive to the stimulant effects of ethanol, while mice housed in groups of 8 showed a delay in the development and the lower sensitivity to these effects (staircase effect). These effects may be related to the stress induced by social isolation and indicate that optimal social conditions might prevent the risks of ethanol addiction.**

## REFERENCES

1) Robinson, T. E., & Berridge, K. C. (1993). *The neural basis of drug craving : An incentive-sensitization theory of addiction. - PubMed—NCBI.* https://www.ncbi.nlm.nih.gov/pubmed/8401595

2) Araujo, N. P., Camarini, R., Souza-Formigoni, M. L. O., Carvalho, R. C., Abílio, V. C., Silva, R. H., Ricardo, V. P., Ribeiro, R. de A., & Frussa-Filho, R. (2005). The importance of housing conditions on behavioral sensitization and tolerance to ethanol. *Pharmacology Biochemistry and Behavior*, *82*(1), 40-45. https://doi.org/10.1016/j.pbb.2005.07.009

3) Rueda, A. V. L., Teixeira, A. M. A., Yonamine, M., & Camarini, R. (2012). Environmental enrichment blocks ethanol-induced locomotor sensitization and decreases BDNF levels in the prefrontal cortex in mice : EE and ethanol sensitization. *Addiction Biology*, *17*(4), 736-745. https://doi.org/10.1111/j.1369-1600.2011.00408.x

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